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Do we really want AI answering on our behalf? A study of smart replies usage

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Abstract. The goal of this research is to find criteria influencing the use of smart replies in AI-mediated communications and identify the sender's perception of smart replies as a communication tool. We conducted qualitative and quantitative research using surveys and interviews with a population of French native speakers. During our experiment, we shared various communication scenarios using emails and text messages (including both professional and personal contexts) with fifty college students. We offered them the choice between smart replies or their own handwritten reply. We then followed up with interviews with a subset of students to better understand their replies to the survey and their relationship to AI-mediated communication. Analysis of the collected data points toward a broader acceptance of smart replies when the author only intends to acknowledge that the message was received and understood. On the contrary, reply suggestions are often dismissed by the sender as too casual for professional communications and too formal for family or friends.

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Introduction

With the ubiquity of information systems came the rise of computer-mediated communication (CMC) (Hohenstein and Jung (2018); Chen et al. (2019)). Advances in machine learning and artificial intelligence as a whole during the last decade paved the way for intelligent systems that can act as agents (i.e., chatbots, virtual assistants) or co-authors by suggesting replies, autocompleting messages, translating or correcting texts (Sundar and Lee (2022)). Users are interacting with these tools daily (Goldenthal et al. (2021)) in what is known as artificial intelligence-mediated communication (AI-MC). AI-MC became omnipresent thanks to both a constant increase in products and devices integrating AI solutions as well as recent breakthroughs in machine learning applied to natural language processing such as translation, autocompletion (Chen et al. (2019)) or generative models for text (Dwivedi et al. (2023)).

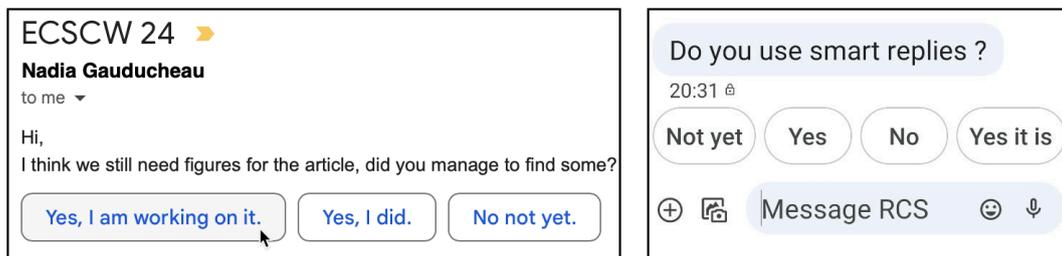


Figure 1. Examples of smart replies proposed to users of communication systems. On the left side, smart replies as featured in Gmail online client. On the right side, shorter smart replies offered by Android Messages.

This work focuses on smart replies: reply suggestions generated by an AI so users can quickly answer a message without writing anything themselves, as shown in Figure 1. When receiving a message, many communication tools and platforms offer to choose from pre-written answers that can either be sent as is or manually completed. These responses are mostly intended to replace short messages like the ones exchanged in instant messaging applications (Microsoft Teams, Facebook Messenger), by text message (Android's *Messages* app), or by email (Gmail, Outlook) with a quarter of all emails being shorter than 20 words (Kannan et al. (2016)). We can, for example, point out that 10% of the 300 billion emails sent every day (Petty (2021)) include AI-generated smart replies (Kannan et al. (2016)). Faced with a growing use of these tools, companies like Google now offer access to advanced smart reply models and text generation algorithms as API so AI can be integrated into third-party software as a co-author and writing assistant.

Related work

The usage of artificial intelligence-mediated communication has been widely studied following the rise in popularity of such technologies (Robertson et al. (2021)). Many research projects focus on the perception by the recipient of messages written by an AI (Liu et al. (2022); Mieczkowski et al. (2021); Angelis and Gonçalves (2020); Jakesch et al. (2019)) even though, in most real-life scenarios, the status of the sender is never disclosed and the recipient is unaware that an AI co-authored the message.

Studies on the perception and usage of authors using AI tools are rare. Few researchers studied the criteria underpinning the acceptance of smart replies (Robertson et al. (2021); Asscher and Glikson (2021)) or their influence on communication (Hohenstein and Jung (2018)) from the sender's perspective. Some studies mention the role of autonomy and agency for the author (Barlas (2019); Candrian and Scherer (2022)) but without accounting for the various usage contexts and their impact on whether the sender will delegate writing to an automated system. Both in computer science (Ribeiro et al. (2016); Schaffer et al. (2019); Cai et al. (2019)) or psychology (Goldenthal et al. (2021)), most of the analyses conducted are quantitative, and few offer a qualitative analysis of such interactions in AI-mediated communication (Hohenstein and Jung (2018); Robertson et al. (2021); Shin et al. (2022)).

Data on the actual usage of these technologies is scarce. In most experimental studies, users are encouraged or forced to use smart replies (Hohenstein and Jung (2020); Mieczkowski et al. (2021)), not taking into account their willingness to use smart replies in their daily communications. Some results and ongoing work from qualitative analysis of interviews point toward a lack of interest regarding the usage of smart replies (Liu et al. (2022); Mieczkowski and Hancock (2022)) without establishing criteria for user adoption.

Our work aims toward both a qualitative and quantitative analysis of how authors perceive smart replies suggested by an AI. Through surveys and interviews with users of such systems, we identify usage criteria for reply suggestions and explore the author's perception of these communication tools. We specifically emphasize the author's sincerity and its correlation with the usage of smart replies. Existing results underline how the use of AI causes messages to be perceived as less sincere (Glikson and Asscher (2023)) with a lower trust toward the sender (Liu et al. (2022)). These results are focused on the perception of the recipient of those messages. Instead, we focus solely on the author's perception. By conducting two *a priori* analyses and sampling the smart replies used in our surveys, we ensure that smart replies are appropriate to each simulated scenario and that their quality will not impact the usage of AI-generated replies.

We can then formulate the following research questions:

- How often are smart replies used by authors?
- Does the usage of smart replies depend on the context (personal or professional) of the communication?

Methods

Our goal for this study is to offer participants a series of communication scenarios where they have to reply using prewritten AI suggestions or by writing their own replies. To reflect the diversity of use cases for AI-MC, we chose two communication contexts representative of situations where such suggestions are used: one involves communication between colleagues via Gmail, and the other involves communication between acquaintances using the text messaging application Messages. The surveys were conducted with French-speaking students, so all scenarios, messages, and smart replies were in French. Related to professional scenarios, all the students enrolled in this survey had prior professional experience include at least an internship.

Choice of AI-MC tools

Carrying out this study required a pool of AI-generated reply suggestions to design our surveys. Creating such a dataset is made difficult by the complexity and opacity of state-of-the-art models (Arrieta et al. (2020)). Instead of prototyping our own reply suggestion system, we relied on the existing and widely available Smart Reply functionality integrated into Google's ecosystem. We used this feature to generate a pool of context-appropriate smart replies for various communication scenarios. This approach comes with several advantages in our use case: Google Smart Reply is available in French, the native language of all the participants in our study, during both the surveys and interviews. This solution is also embedded into the Gmail email client and the Messages Android application. It provides unified smart replies across our usage scenarios (professional emails and personal texts). Hence, the quality of reply suggestions remains homogeneous across the scenarios and will not influence the rate at which authors select smart replies. Gmail is a widely used email provider with almost two billion monthly users¹ and is frequently used by companies as a professional email solution for their employees. Messages is the default text and instant messaging app on Android, downloaded billions of times². These two tools are representative of the daily habits of billions of users when it comes to AI-mediated communication. Google also provides one of the only smart reply solutions documented by its designers in Kannan et al. (2016), making it easier to gather insights into how our experimental data are generated.

Designing scenarios and gathering smart replies

We created 18 scenarios divided into two main categories (professional and personal). For each category, we designed scenarios that cover various types of speech acts as presented by Searle (1969). As an example of the commissive act, the professional scenario is about planning a business meeting with a colleague,

¹ <https://blog.google/products/gmail/hitting-send-on-the-next-15-years-of-gmail/>

² <https://play.google.com/store/apps/details?id=com.google.android.apps.messaging>

and the personal one is about scheduling a dinner with a friend. Every scenario includes a single sentence summary used to give the participant some context and an initial message that the participant will have to reply to using their choice of smart reply or freeform text. All scenarios and messages are available in French as used in our survey (see Appendix A) and translated into English (see Appendix B).

We then gathered examples of smart replies by sending the initial message of each communication scenario through Gmail (for professional scenarios) or Messages (for personal ones) and taking note of the proposed smart replies. We replayed each scenario multiple times to gather 138 smart replies (an average of 8 per scenario).

Pretest survey and filtering smart replies

In our experiment's second step, we selected a sample of smart replies that seemed appropriate to each communication scenario. We removed suggestions of poor quality as they could have dissuaded participants from choosing them, and the aim of this work is not to benchmark the quality of AI smart replies. We conducted an initial analysis to remove ineffective or inappropriate messages from the corpus (such as semantic inconsistencies between the initial message and the suggestion or inappropriate tone). The process reduced the number of smart replies in our dataset from 138 to 78.

Subsequently, we submitted this corpus of suggestions to users to validate our analysis. Specifically, 25 French engineering students (aged 19 to 22) participated in a pretest survey where they read 18 messages along with the AI-generated smart replies, as shown in Figure 2. Note that the mock-ups in this figure are translated to be easily understandable, but the pretest was conducted in French like the rest of this study. They were instructed to circle any smart reply they deemed appropriate. This pretest survey reduced the pool of appropriate smart replies to 59, allowing our final survey to feature an average of 3 smart replies suggested in each scenario. This average matches what is commonly seen in products featuring smart replies like Gmail, Microsoft Teams, Android Messages, or Facebook Messenger.

Survey and interviews

After we retained only appropriate AI suggestions, the 18 communication scenarios were presented to a new sample of 56 participants (also engineering students of the same age) who did not take part in the pretest survey and were asked how they wished to reply to the initial message of each scenario. The survey was carried using paper forms where student had the option to create their own response (handwriting it on the form) or use one of the AI suggestions (by circling it), and if necessary, they could use the suggestion and complete it manually. Figure 3 showcases three examples of questions featured in the survey: in the first one, the participant used a smart reply; the second scenario was answered with a handwritten freeform message; and in the third example the participant used a

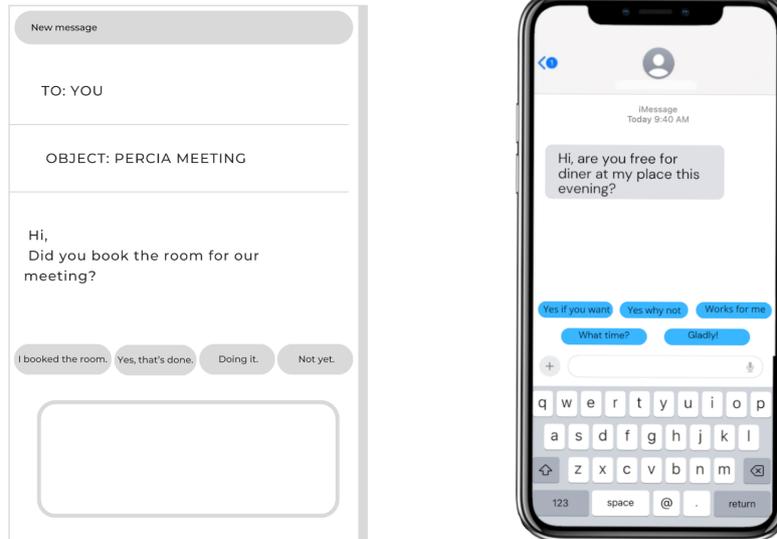


Figure 2. Translated mock-ups of email and text message user interfaces as used for the pretest survey. During this step, participants had to circle smart replies that they deemed appropriate to the initial message.

smart replied supplemented with handwritten greetings ("Hello [smart reply] Regards"). Participants answered 99% of the scenarios, resulting in a dataset of 995 answers.

Subsequently, 13 participants took part in a follow-up semi-structured interview to explain and comment on their choices during the survey and learn more about their usage of smart replies technologies in their daily communications.

Survey and interviews results

| scenario | smart reply | free text | both combined | no answer |
|------------|-------------|-----------|---------------|-----------|
| E1 | 20 | 9 | 25 | 2 |
| E2 | 12 | 15 | 29 | 0 |
| E3 | 17 | 10 | 28 | 1 |
| E4 | 28 | 13 | 15 | 0 |
| E5 | 11 | 28 | 17 | 0 |
| E6 | 33 | 6 | 17 | 0 |
| E7 | 18 | 16 | 22 | 0 |
| E8 | 4 | 27 | 25 | 0 |
| E9 | 1 | 51 | 3 | 1 |
| E10 | 24 | 15 | 17 | 0 |

Table I. Results of the quantitative survey for email communication in professional scenarios.



Figure 3. Sample of various answers to our survey. In the first example (left) the participant chose to answer using a smart reply ("Hi, can you send me the photos from yesterday's party?" answered with "Yes no problem"). Second scenario (middle) showcases the use of free text to answer the initial message ("I finally got my driver's license!" answered with "BRAVOOO!"). The third example illustrates combined use of a smart reply supplemented with text, the smart reply is displayed as [...] in the free text area ("Hello, Could you send me your notes on yesterday's meeting?" answered with the smart reply "Here are my notes" and the participant added "'Hello, [smart reply] Regards").

Quantitative results

Our survey results are available in Table I for professional emails and Table II for personal text messages. We observe that smart replies alone were used in 36% of answers, and free text was also selected by participants in 36% of their answers, with a combination of free text and AI suggestions accounting for the remaining 28%. These results suggest that smart replies, alone or supplemented by free text, are used in more than half of the scenarios in this experiment. However, this usage of smart replies is much higher than expressed during interviews or observed in other studies (Kannan et al. (2016)). This frequency is likely related to the survey protocol, which encourages participants to choose smart replies more often than in a regular setting.

When comparing results between email and text message communication scenarios, we observe that free text alone is similar in both contexts (34% of answers rely on free text alone for emails and 39% for text messages). However, the use of AI suggestions differs between those two contexts: with emails, smart replies alone are used in 30% of the answers, and smart replies supplemented with free text are used in 35% of the answers. With text messages, these rates shift to 43% of smart replies alone and only 16% of smart replies supplemented with free text. When used to reply to an email, smart replies are very often supplemented with text. Analysis of the replies reveals that the opening and closing statements

| scenario | smart reply | free text | both combined | no answer |
|-----------|-------------|-----------|---------------|-----------|
| S1 | 31 | 15 | 9 | 1 |
| S2 | 18 | 18 | 19 | 1 |
| S3 | 30 | 17 | 8 | 1 |
| S4 | 16 | 22 | 17 | 1 |
| S5 | 23 | 27 | 5 | 1 |
| S6 | 31 | 18 | 6 | 1 |
| S7 | 31 | 18 | 6 | 1 |
| S8 | 11 | 41 | 2 | 2 |

Table II. Results of the quantitative survey for text messages in personal scenarios.

are often added to make the reply more formal ("Hello" / "Best regards"). Professional email communication encourages participants to use such statements as they are not included in AI-generated smart replies. Participants saw smart replies as more acceptable for text messages with friends and family.

Scenarios that elicited the highest usage of smart replies only are E1, E4, E6, and S3 (see Appendix A and B). These scenarios are all directive speech acts where the participant has to validate or confirm an action. In these cases, short smart replies ("Yes", "Of course", "Understood", or "Thank you") seemed appropriate to participants because, as authors, they want to acknowledge to their recipient that they received and read the initial message. Conversely, situations that prompted the highest use of free text (alone or supplementing a smart reply) are scenarios E9, S2, S4, S5, and S8 (see Appendix A and B). Given the social context, most AI suggestions are inappropriate in these scenarios. For example, message E9 requires apologies or justifications that are unavailable in the pool of smart replies. Some scenarios imply intimacy with the recipient, but all the smart replies lack this intimacy. One of the limitations of AI becomes apparent in these scenarios: the smart replies are often too neutral and lack linguistic markers appropriate to the social distance required by the situation. This inappropriate tone is amplified by suggestions that are very heavily biased toward positive sentiments so that there were no apologies suggested in any of the 138 smart replies we generated, even for situations that were very obviously prompting participants for an apology (e.g. scenario E9 "*I am very disappointed by your absence at yesterday's meeting...*").

Qualitative results

During the semi-structured interviews, all participants were allowed to explain their use or non-use of AI suggestions, and then they were asked about their feelings toward AI assisting them as a co-author. Participants indicate that most of the time, they do not use smart replies because the content of the replies does not correspond to what they would like to communicate. They consider the suggestions unsatisfactory regarding content because it does not fully capture their intent as authors or are insufficiently detailed ("*there wasn't enough information...*").

I'd still prefer to specify that he needs to send [the document] to me as soon as possible". Participants also deem the suggestions inappropriate regarding their tone and writing style (too formal, too casual, not displaying enough intimacy) as summarized by one of the participants: *"It's my brother, I am close to him. I am not gonna settle for a somewhat generic message. I really wanna tailor [my reply] to him, to what he's telling me".*

Often, the reasons cited by participants for not using smart replies are linked to acceptability. Users consider that the use of suggestions is hardly compatible with their representation (or model) of interpersonal communication. In particular, participants mention their autonomy as authors and a reluctance to delegate to an AI when they can write the reply themselves (*"write my own reply, so it's my own spontaneous reaction rather than something that I didn't create myself"*). They emphasize the importance of making an effort during communication to ensure a form of reciprocity with their recipient (*"you can't just afford to send a short message, [you have to] spend some time [writing it]"*). The issue of sincerity is also raised by some participants (*"first, it's important to write [yourself]... it's just impersonal to use an automatic message... I'd feel bad to just click on a button and send it if it's in a personal context"*). Finally, we observe that participants anticipate their recipient's negative reaction to an automated reply: *"this kind of message, I think the person receiving it suspects it's somewhat of a canned response. And so it can give the feeling that 'yeah that's cool but I don't really care'"*. Users consider both their relationship with the recipient and the context of their own usage. For example, using an AI smart reply may seem inappropriate unless the author is under time pressure or mobility, which prevents them from writing a longer and more personal reply.

These interviews also highlight situations that are compatible with the use of suggestions, at least from the author's perspective: replies that only serve to acknowledge the initial message (*"That's a quick info... The goal is only to give the info nothing more"*), short and casual replies to friends and loved ones or conversely to express disapproval with a cold, short and generic reply (*"So, that's the code to express that I'm angry"*) or when the reply is insincere (*"Plus, if I especially don't want to tell them what I'm really thinking, a canned response isn't that bad"*).

Conclusion

This exploratory study on the usage of reply suggestions demonstrates that participants, within the framework of fictional scenarios, are rather inclined to select smart replies generated by an AI. However, we remain cautious about the scope of the results as the study setup encouraged participants to use smart replies.

This study underlines that situations involving "acknowledgment" are conducive to the use of suggestions by the author. We also highlight the limitations of AI's smart replies. Despite *a priori* filtering of the replies, suggestions offered to participants are often judged inappropriate or insufficient to be used on their

own. The smart replies fail to capture the complexity of exchanges: the variety of communication acts, different types of relationships, and the context of conversations (mobility, conversational history, etc).

Finally, this study identifies that some users have representations of communication that are incompatible with the use of smart replies (reciprocity, delegating authorship to AI, sincerity). These results are part of an ongoing work and need to be confirmed and further explored with additional interviews and new surveys using a protocol closer to the real-life use cases of participants.

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Appendix A - Original scenarios in French

In every scenario, A is the sender, and B is the message's recipient. During the survey, participants answered as B. To keep the table readable, it only displays scenarios' names: the initial message used in the survey may be longer to give participants more context.

| | Echanges professionnels par Gmail | Echanges personnels par SMS |
|---|--|--|
| A demande une confirmation | [E1] As-tu réservé la salle ? | [S1] Es-tu en route pour venir ? [S2] Es-tu libre pour venir manger...? |
| Une demande d'action par A | [E2] Peux-tu m'envoyer le document | [S3] Tu peux m'envoyer les photos...? |
| A annonce un problème (et n'est pas responsable) | [E3] Je ne pourrais pas venir, je suis malade | [S4] Je ne pourrais pas venir, je suis malade |
| A annonce un problème (et est responsable) | [E5] Je n'ai pas pu terminer ce que tu m'avais demandé... | [S6] Désolé ne de pas être venu.... j'ai oublié |
| L'annonce d'une bonne nouvelle pour A | [E4] J'ai terminé en avance. Je te l'envoie | [S5] ...J'ai mon permis ! |
| L'annonce d'un « cadeau » pour B | [E6] Je viens de te faire parvenir les documents.. [E7] Tu nous accompagnes pour la visite de demain | [S7] J'ai déposé ton cadeau |
| Indication d'une faute de B | [E8] Tu n'as pas envoyé les documents [E9] Je suis très très déçu de ton absence à la réunion d'hier... | [S8] Tu as oublié de m'envoyer les photos |
| Demande d'information | [E10] Je suis en groupe de projet avec Daniel, tu le connais ? | |

Appendix B - Scenarios translated into English

In every scenario, A is the sender, and B is the message's recipient. During the survey, participants answered as B. To keep the table readable, it only displays scenarios' names: the initial message used in the survey may be longer to give participants more context.

| | Professional scenarios via Gmail | Personal scenarios via text message |
|--|---|---|
| A asks for confirmation | [E1] Did you book the room? | [S1] Are you on your way? [S2] Are you free for dinner...? |
| A asks B for documents | [E2] Can you send me the report? | [S3] Can you send me the pictures...? |
| A states a problem (and isn't responsible for it) | [E3] I can't join you, I'm sick | [S4] I can't come, I'm sick |
| A states a problem (and is responsible for it) | [E5] I couldn't finish what you asked me to do... | [S6] Sorry I wasn't there... I forgot |
| A shares good news | [E4] I finished it early. I'm sending it to you right now | [S5] ...Got my driver's license! |
| A is doing a favor to B | [E6] I was able to send you the documents. [E7] You're allowed to join us for tomorrow's visit | [S7] I just mailed your gift |
| A points a mistake made by B | [E8] You didn't send me the report [E9] I am very disappointed by your absence yesterday... | [S8] You forgot to share the photos |
| A asks for information | [E10] I'll be working with Daniel, do you know him? | |